

REMARKS

Claims 1-6, all the claims pending in the application, stand rejected. Applicants have made a minor grammatical correction to independent claims 1, 3 and 5, by adding the article “a” before “difference.” Claim 4 is amended for consistency.

New Prior Art

The Examiner cites a new reference “Physical Principles of Medical Imaging,” 2nd Edition, Sprawls, Jr. Chapter 18, pages 253-265, 1993 (“Sprawls”). As a preliminary matter, Applicants will observe that the chapter in Sprawls entitled “Blur, Resolution and Visibility of Detail” at pages 253-265 is a low technical level and includes only basic teachings with regard to the concept of blur in image processing. Pages 253-258 are merely introductory to the concept of blur and its effect in various optical systems including the effect on the contrast of objects of different size (Fig. 18-15). Sprawls discusses the impact of blur on resolution at pages 258-260 and discusses the fundamental principle that blur has an effect on resolution. When introducing this subject, Sprawls simply states at page 259 with regard to Fig. 18-6 that lines on a test pattern which get smaller and closer together result in an increase in spatial frequency (line pairs per millimeter). Sprawls notes that an imaging system is evaluated by imaging a test object and observing the highest spatial frequency (or minimum separation) at which the separation of the lines is visible. At pages 260-263, Sprawls presents Figs. 18-8 illustrating cases of no blur, medium blur and high blur with regard to spatial frequency. Sprawls simply concludes that increasing spatial frequency corresponds to increasing image detail and reducing object size. The illustrated contrast transfer functions in Fig. 18-8 merely shows the ability of an imaging system to transfer contrast of objects of different sizes in the presence of blur. The remaining text at page 260 and Fig. 18-9 simply shows a contrast function associated with two types of blur, one being characteristic of motion and focal spot blur (solid) and the other generally characteristic of receptor blur (broken).

In sum, the teaching in Sprawls is extremely basic and contains no specific discussion with regard to the correction of blur amounts for detection data at two different image planes. Indeed, Sprawls has no consideration of differences in image data at different focal lengths or distances. Notably, none of the Figures or the discussion in Sprawls concerns different distances of an image plane from an object under radiation exposure. Accordingly, Sprawls has no

teaching that would be relevant to any modification of the previously cited prior art reference to Gureyev.

Double Patenting

Claims 1-6 are rejected on the ground of non-statutory obviousness-type double patenting as being unpatentable over claims 1-10 of U.S. Patent 7,171,031 (the ‘031 Patent) in view of Sprawls. This rejection is traversed for at least the following reasons.

The Examiner reproduces text from claim 1 of the ‘031 Patent and admits that it does not recite correcting blur amount. The Examiner states “Sprawls discloses correcting blur amount by filter processing using a function of spatial frequencies, with reference to Figs. 18-7, 18-8 and 18-9 of Sprawls.”

As already noted, Sprawls has nothing more than a high level generic teaching of blur, without any discussion of filtering and absolutely no discussion of the application of blur processing to images in different image planes. There is no teaching or suggestion that would suggest any modification of claim 1 of the ‘031 Patent.

Further, the Examiner only cites claim 1 in his analysis. There is no discussion of the additional limitations of claims 2-6. The rejection is inherently flawed in this regard since Applicants have no idea what the Examiner has in mind. Thus, this rejection should either be withdrawn or stated in sufficient detail so that the Examiner’s position would be understood.

Claims 1-6 are rejected on the ground of non-statutory obviousness-type double patenting as being unpatentable over claims 1-3 of 6,704,591 (the ‘591 Patent) in view of Sprawls. This rejection is traversed for at least the following reasons.

The Examiner reproduces claim 1 of the ‘591 Patent and admits that it does not recite correcting blur amount. The Examiner again looks to Sprawls and the high level and basic discussion of blur with regard to Figs. 18-7, 18-8 and 18-9 and concludes it would have been obvious to modify claim 1 to meet the limitations of claims 1-6.

Again, Sprawls has no teaching or suggestion relevant to a modification of claim 1 of the ‘591 Patent such that the claimed invention would be obvious. Moreover, the Examiner fails to discuss other claims that have been rejected. Thus, this rejection is basically flawed and should

either be withdrawn or freshly restated with sufficient detail so that Applicants can understand the basis for the Examiner's rejection.

Claims 1-6 are provisionally rejected on the grounds of non-statutory obviousness-type double patenting as being unpatentable over claims 3-4 and 11-12 of copending Application 10/671,786 ("the '786 Application") in view of Sprawls. This rejection is traversed for at least the following reasons.

The Examiner recites claim 3 of the '786 Application and states that it reads on claim 1 of the application but does not recite correcting blur amount. The Examiner looks to the high level and basic description of blur in Sprawls, and in particular the illustration in Figs. 18-7, 18-8 and 18-9, for relevant teachings.

Once again, Sprawls is wholly deficient in teaching the subject matter set forth in Applicants' claims as already noted. Further, the Examiner fails to provide any detailed comparison of claims 3, 4, 11 or 12 to claims 2-6 of the present application. Indeed, there is no discussion of claims 4, 11 or 12 at all from the '786 Application. Thus, the Examiner's rejection is incomplete and inadequate and should either be withdrawn or restated with sufficient detail so that Applicants can understand the Examiner's position.

Claim Rejections - 35 U.S.C. § 103

Claims 1-6 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Gureyev in view of Sprawls. This rejection is traversed for at least the following reasons.

In framing the rejection at page 6 of the Office Action, the Examiner compares the limitations of claims 1, 3 and 5 to the teachings in Gureyev. Notably, however, the Examiner fails to consider the specific language in each of limitations (a), (b), (c) and (d) that are directly related to a blur amount, and data that has been corrected for such blur amount. Applicants wish to stress that it is not simply the consideration of blur that is novel and unobvious in the presently claimed invention, but it is the specific way in which the blur amount is considered and corrected to achieve accurate phase data. In particular, as previously noted in the Amendment filed on July 26, 2007, and with regard to the limitations in claim 1 as exemplary of the corresponding limitations in claims 3 and 5 as well, the teachings in Gureyev are deficient.

Limitation (a) of claim 1 requires “correcting blur amount by filter processing using a function of spatial frequencies for at least one of first detection data and second detection data obtained by detecting intensity of radiation on plural detection planes at different distances from the object, said first and second detection data representing radiation image information on the plural detection planes, respectively.” The Examiner admits that Gureyev does not correct blur. The Examiner also admits that there is no correction by filter processing using a function of spatial frequencies. The Examiner asserts, however, that Gureyev discloses plural sets of detection data, with reference to Figs. 1 and 2 and the text at page 361 of Gureyev. A review of Figs. 1 and 2 shows only one image plane and only one detector. There is no teaching or suggestion that the image plane was moved and that multiple images are collected for each location. In short, there is no teaching of the use of plural detection planes.

Further, with regard to the Examiner’s reference to any admission on page 17, such statement is not relevant to Gureyev, as already stated in the previous Amendment. Thus, this analysis fails.

With regard to **limitation (b)**, claim 1 recites “obtaining differential data representing difference between said first detection data and said second detection data in which the blur amount has been corrected for at least one thereof.” The Examiner asserts that at page 357, there is a disclosure of the processing of differential images in Gureyev. While there may be multiple images processed, they are not at different distances and do not meet the limitations of the claim. Further, as admitted by the Examiner, there is no teaching of data having a blur amount.

With regard to **limitation (c)**, the claim requires “obtaining Laplacian of phase on the basis of said differential data and any one of said first and second detection data before correcting the blur amount and the detection data in which the blur amount has been corrected.” The Examiner merely refers to equation (3a) on page 357 and asserts that this meets the limitation of the claim. A careful examination of the description of equation (3a) shows that it is derived from equation (3) and represents a conventional differential transport of intensity equation, which is valid in the Fresnel (peraxial) approximation. This has nothing to do with a Laplacian of phase on the basis of (1) differential data and any one of (2) first and second detection data before correcting a blur amount and (3) the detection data in which the blur

amount has been corrected. These are express limitations of the claim which are not found anywhere in Gureyev. Moreover, as admitted by the Examiner, there is no teaching of blur considerations in Gureyev.

Finally, **limitation (d)** requires “obtaining phase data of the radiation by performing inverse Laplacian computation on the Laplacian of phase.” In response to this limitation, the Examiner simply notes that at page 360 there is a statement “There are many well-known methods of solving the equations of the type (2) and (3).” This is hardly a teaching of inverse Laplacian computation. Applicants have specified a particular step for retrieving phase data and have not simply stated a general concept of obtaining phase data, and thus are entitled to distinguish over the prior art because of its failure to consider the specific limitation.

Sprawls

Applicants already have discussed the deficiencies in Sprawls. The Examiner refers to the same illustrations in Figs. 18-7, 18-8 and 18-9 of Sprawls. The only basis for a similarity to the present invention is that the Examiner finds a common structure with regard to Fig. 5 of the present application. However, Fig. 5 alone is not the invention. Applicants have devoted teachings in pages 10-24 and Figs. 1-9 to explain the invention, particularly at pages 14-20. No detail or even conceptual consideration of these principles is found in the prior art, especially the simple illustrations in Sprawls.

Thus, Applicants would submit that the present invention as claimed is patentable over the prior art.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

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